

(12) UK Patent Application (19) GB (11) 2 388 154 (13) A

(43) Date of A Publication 05.11.2003

(21) Application No: 0308223.7

(22) Date of Filing: 10.04.2003

(71) Applicant(s):
Barrie Jones
40 Ruskin Grove, Bredbury, STOCKPORT,
Cheshire, SK6 1DW, United Kingdom

(72) Inventor(s):
Barrie Jones

(74) Agent and/or Address for Service:
Harrison Goddard Foote
Orlando House, 11c Compstall Road,
Marple Bridge, STOCKPORT, SK6 5HH,
United Kingdom

(51) INT CL⁷:
E05B 49/00 // G06K 13/07

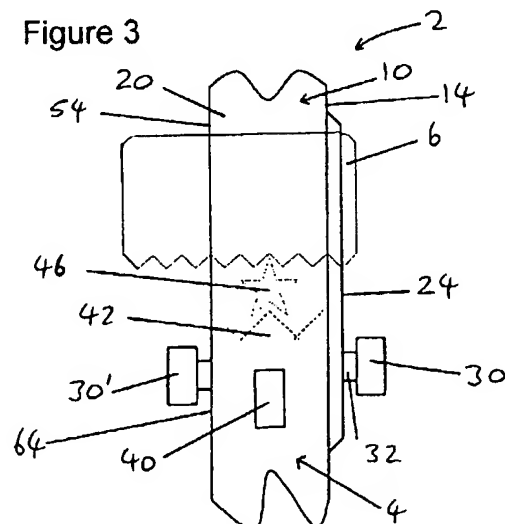
(52) UK CL (Edition V):
E2A ALV

(56) Documents Cited:
US 4288783 A

(58) Field of Search:
UK CL (Edition V) E2A
INT CL⁷ E05B, G06K, G07C
Other
Online: WPI, EPODOC, JAPIO

(54) Abstract Title: Locking apparatus with key retention

(57) The invention provides a locking apparatus for a door comprising a key e.g. a card 6 wherein the key is engageable with a lock from a first side 14 of the door to enable the door to be unlocked and wherein the card is subsequently only removable from its engagement with the lock at a second side 54 of the door remote from the first side. The key is preferably only removable when the door is again locked.



GB 2 388 154 A

1/2

Figure 1

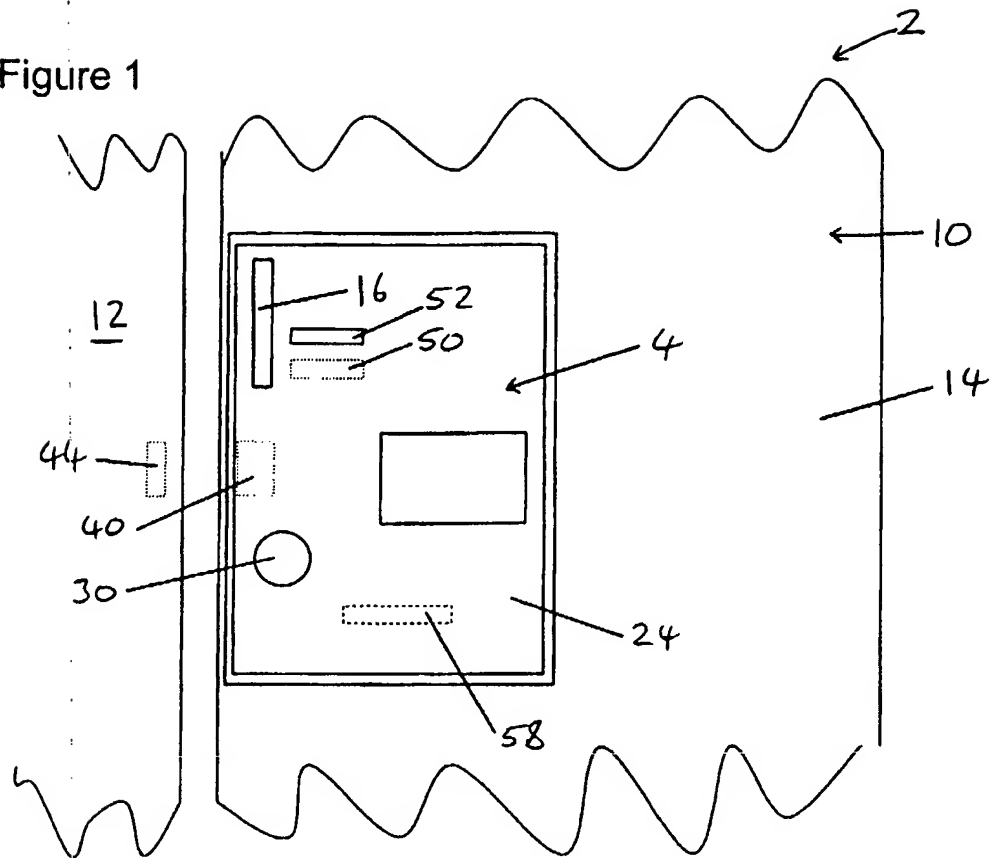


Figure 3

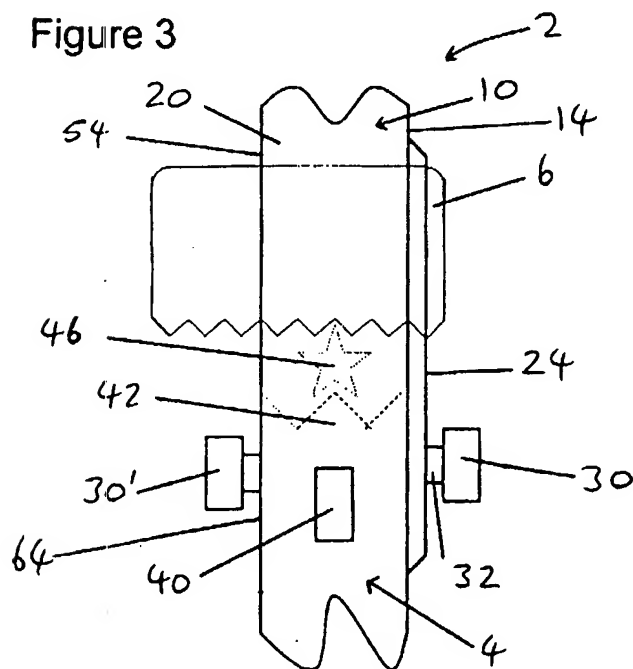
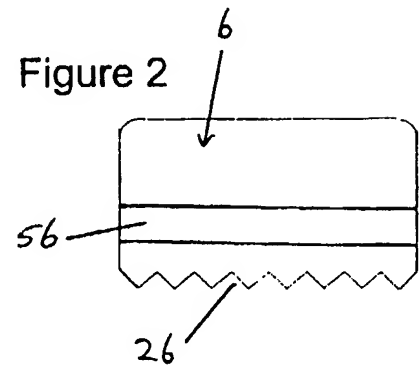
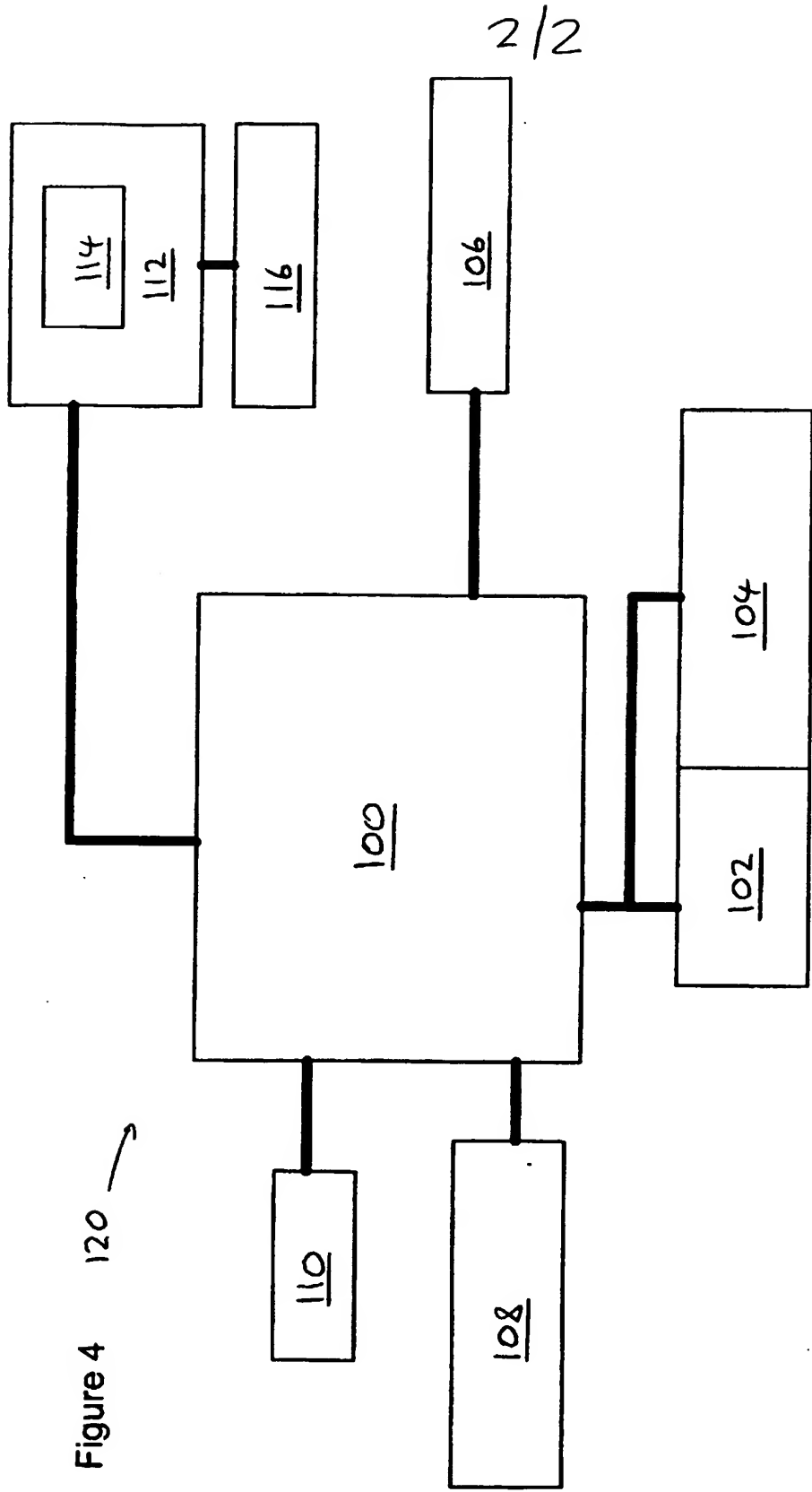


Figure 2





The present invention relates to a locking apparatus and, in particular, to a locking apparatus for use where an increased level of security is required in, for example,
5 hotels and other areas with multi user access.

A wide variety of door locking apparatus are known in the art. Examples of locking apparatus providing additional security and, in particular, the retention of a key for a lock during some point in the operation of the lock and other security features are
10 described below.

JP2002147074 (SANPO Lock Co Ltd) describes a card lock, which retains the card in the lock (unless the card meets particular dimensional requirements).

15 DE10033043 (NEERINCX Joseph) describes a deposit box where a key is retained in the deposit box until the box is secured into a safe compartment.

US5027553 (VERGARA Florentino) describes a door with an automatic closer, operable after a given delay, so as to close the door in the event of the door being
20 inadvertently left open.

JP2000276622 (HITACHI Information Technology Co Ltd) describes a card lock where information is stored onto a key card about how the card has been operated in the lock so as to record entering and leaving information regarding use of the card
25 with the lock.

(
As ascertainable from the documents indicated above the problems of ensuring that an operator does not inadvertently leave a key in a lock or inadvertently leave a door open after use are known problems with security systems.

- 5 The current invention provides a locking apparatus for a door comprising a key wherein the key is engageable with a lock from a first side of the door to enable the door to be unlocked and wherein the card is subsequently only removable from its engagement with the lock at a second side of the door remote from the first side.
- 10 The sides of a door relevant in describing the invention are the normal front and rear sides of a door as approached by a person walking up to a door rather than any sides which are effectively edges to be retained in a door jamb. The relevant first and second sides of a door are those sides, which are not simultaneously accessible by one person in normal use when a door is closed.
- 15
- The locking apparatus of the invention is considered suitable for a wide range of doors, closures, covers, lids, windows, gates and other door-like means for entering from one enclosed space to another space. However, for the purposes of practising the invention the locking apparatus is required to be used with a door where access of one
- 20 side of the door from another side of the door, when the door is closed, is not reasonably practicable. Therefore, use of the locking apparatus of the invention with doors which are in effect barred doors, gratings and low gates all of which enable access to one side of a closed door from another side of a closed door without opening the door, for example, by a person inserting their hand between bars in such a door or
- 25 placing their arm over such a door, are not primarily intended for use with the invention. This is because the benefits of the invention, at least in part, relate to the way the locking apparatus, when installed in a door, effectively controls the behaviour of a user of the door/locking apparatus such that a user cannot use a key, in a locking apparatus according to the invention and retrieve that key without at least opening the

door. Hence, a user for example, cannot retrieve a key unless the other side of the door is accessed wherein other security features may, for example, be activated.

The locking apparatus according to the invention may use a key in the form of a card.

5 The use of a card is advantageous since a card key has a relatively small cross-section and an aperture can be readily placed in a door such that the card may pass through from one side to another side of the door without the aperture significantly impinging upon or weakening the structure of said door. In addition card keys are more readily carried by a user such as when in credit card format and additional features may be
10 readily combined with use of the lock, such as recording of information about the use of the lock on the card, recording information from the card by a security system to identify a user of the door and so forth.

The aperture through a door, doorway or doorjamb to facilitate use with a locking
15 apparatus of the invention may be provided with a sealing means to prevent unwanted transfer through the aperture. For example, an intumescent material may be present so as to close the aperture in the event of a fire. This has the advantage that a fire door resisting a fire cannot be unlocked as the aperture becomes blocked. Similarly the aperture may be closeable between certain times to prevent out of hours access and
20 the like.

The locking apparatus according to the invention may operate such that the key is only removable, once engaged in the lock, when the door is again locked. Therefore, when a person uses a door equipped with a locking apparatus according to the
25 invention the key is inserted in a first side of the door, the door has to be opened and the door again closed and locked before it is possible to remove the key. Since removal of the key is only possible from the second side of the door it is therefore necessary for the user of a key to have opened the door and passed through the open doorway so as to regain and hence retain the key. This is a significant advantage of
30 the invention, as it requires a given behaviour of a user so as to effectively use a door

- (
- 5 equipped with the locking apparatus of the invention. In particular, if a user uses their key to open the door for another person the user may therefore be unable to retrieve their key unless they themselves also pass through the door. Furthermore, if the door is made in the form of a turnstile it is possible to ensure, since only one person can pass through the turnstile (door) at one time, that if a key holder uses the key for the benefit of another person the key holder effectively loses their key since it is only accessible by the other person who cannot pass the key back through the door, given the nature of doors suitable for realising the benefit of the invention.
- 10 The locking apparatus thus far described relates to the access of a first side of a door from a second side. However, it is with the scope of the invention to provide a locking mechanism according to the aforementioned requirements where users can pass both ways through a door either at will, given the above criteria are met, or alternately from one side of the door to the other and only then back again.
- 15 A locking apparatus according to the invention may allow a key to be used from the second side to the first side of the door as it is useable from the first to the second side of the door.
- 20 In many situations, particularly where there are several people each with a key requiring common access to an area it is convenient that such key holders may freely pass from one side of the door to the other and back again as they wish. However, the benefits of the invention require that a user must at least open the door after inserting the key so as to retrieve their key and more preferably must open the door go through
- 25 the door and close the door and lock it before they are able to retrieve their key once more. This restricts the ability of a key holder to allow access of third parties without themselves accompanying those people. This is particularly advantageous when a locking apparatus of the invention is used with the door in a situation where accompanied entry to an area is required, for example, by visitors to a prison or such
- 30 like.

The locking apparatus of the invention may be so arranged that on each subsequent use of the key the functions of the first and second sides of the lock interchange.

Such a function is particularly advantageous in that only one use of the key to pass through the door is possible, such as to access a security area beyond the door, until the person who has gained access to the other side of the door returns back through the door and so once again further access through the door from the first to the second side is enabled. This is particularly beneficial in several situations such as where in a security areas it is important that a second access does not occur while a person occupying a security area is locked in that area such as when a further access may result in a snatch and run theft, for example. Other examples include where a hotel room is only rented to one person in which case use of the room by several people independently is not practicable unless people enter and leave at the same time. Other uses of benefit are for toilet cubicles where a universal key may be supplied, for example on payment of a sum, but once a cubicle is occupied another person also possessing a universal key for such cubical lock is unable to accidentally access an occupied cubicle until that cubicle is rendered vacant once more.

A locking apparatus according to the invention comprises a lock and a key. The lock may be conveniently located in a door itself such that use of the key passes the key through from a first side to a second side of the door. Also within the scope of the invention is where the lock is located in a door jamb where the terms the first side and second side of the door for engagement of the key are more broadly construed such that a key, such as a card key placed at a first side of a door jamb, equivalent to a first side of a door and retrieved from the second side of a door jamb, equivalent to a second side of the door (and having similar accessibility criteria) are considered equivalent operations. Similarly other permutations of the location of the lock within the scope of the invention include where the lock is located on both the door and the doorjamb. The term doorjamb includes sides, lintel and foot-board of a door surround.

(
Depending upon the location of the lock the key may therefore, on passing from a first to a second side of the door, pass through the lock, next to the lock or between lock parts.

- 5 It may be advantageous to place a lock in a door jamb since any associated wiring or electronics to further security systems therefore does not require any flying lead between a moveable door and the door jamb so as to communicate information, for example, from a locking apparatus to other equipment, such as a computer.
- 10 A locking apparatus of the invention may use a key, which engages with the lock by means of one or more indentations in the key. Only one, two or three indentations may be present

- Keys are commonly constructed with indentations for engagement with a lock. In the
15 context of the current invention the use of indentations is particularly advantageous as indentations may provide a convenient means for stopping the retrieval of a key once inserted in the lock by means of a catch in the lock to prevent retrieval of the key back on the side the first side, when the key has engaged the lock.

- 20 The one or more indentations in the key, which engage the lock, may do so by means of a toothed wheel in the lock apparatus.

- Mechanically engaging a key with a toothed wheel is a convenient way in which a linear action of inserting a key into a lock, typically perpendicular to a face of a door
25 enables that mechanical movement to be transferred through 90^0 so as to enable a bolt or the like to be withdrawn in a lock so as to unlock a door. The toothed wheel may therefore serve to operate the lock to lock and/or unlock the door.

The locking apparatus of the invention may utilise the one or more indentations in the key to retain the key in the lock so as to prevent extraction of the key during part of the operation of the locking apparatus.

5 To enable effective operation of a locking apparatus of the invention it is necessary to prevent removal of the key from a first side of the door before it is removed from the second side of the door remote from the first side. In many instances it may be appropriate that a key is able to activate a lock by only partial insertion of the key, as an overall physical entity, into the lock such that part of the key protrudes. It is
10 therefore convenient to provide a mechanism whereby the key can be retained in the lock and not removed by force. This is particularly significant when the key is in the form of a card wherein the provision of an indentation in the key may enables the key to be retained in the door such that if excessive force is used to try and remove the key from the door on a first side of the door the key may break off in the lock before
15 removal is possible. Such an action would serve to leave evidence in the lock. The one or more indentations in the key may preferably be present on an edge of the key. The key may be a card key where the presence of an indentation in the edge of a planar card produces a weakness in that card such that exerting force to try and remove a card which has been retained in a lock will potentially cause the card to rip
20 from one edge to the other.

An alternative means for retaining the card in the door is to construct the locking apparatus in a manner whereby it is necessary to engage the key with the lock to such an extent that the key is no longer accessible from the first side of the door when the
25 key is inserted sufficiently that the lock can be unlocked. The key may then protrude on the second side to allow subsequent removal or may only exit onto the second side when the door is opened, by for example, rotating a handle.

The above alternative means for retaining the card in the door may be combined with
30 mechanical retention of the key in the door. Mechanical retention of the key in the

door may include clamping means (e.g. lateral clamping) for the key as well as any use of any indentation in the key as previously mentioned.

5 Types of keys suitable for use with a locking apparatus of the invention are many and varied, however, it is preferable that a card key is used and more preferably that a card key in the form of a key suitable for the storage of information is used. When a card suitable for the storage of information is used there may be transfer of stored information between the card and the lock when the key is engaged in the lock. The preferred means of storing the information in the key or the lock is in a digital form.
10 Suitable forms of the digital retention of information include the use of a magnetic strip or an electrical or the aforementioned indentations on the key.

Keys for use with a locking apparatus of the invention may be user specific. Each user may have a separate key, all operable in the same locking apparatus. A part of the
15 locking apparatus or a device, such as a computer to which it may be externally attached, may record the use of user specific keys.

When not in use keys for use with locking apparatus of the invention may be recorded as non-useable by the locking apparatus, such as when a locking apparatus is linked to
20 a computer. Keys when not in use may be retained in a device accessible by a user code. Such variations are particularly suitable in high security areas where there is staff changeover.

A lock for use as part of a locking apparatus of the invention may comprise a mortise
25 lock. A lock for use as part of a locking apparatus of the invention may act as a deadlock mechanism. Furthermore a lock for use with a locking apparatus of the invention may comprise a latch. This is particularly advantageous where, even with use of the invention, a user may still forget to remove a key from the lock after closing the door and the latch. Therefore if a user forgets to remove the key from the

(
door the door can be at least held shut by means of the latch. Disengagement of the latch may not be possible until a key is used. Furthermore, by providing latch if a user of a key opens the door, fails to go through the door and the door once again closes, the user can no longer retrieve the key. This serves to further reinforce the use of a
5 locking apparatus of the invention as a means for requiring given behaviour of a user such as may required to effectively operate a security system. An audible warning may be provided by the locking apparatus whilst the door is open and/or unlocked to remind a user to not leave a door open or to retrieve their key.

10 The lock of a locking apparatus of the invention may operate to secure a door by means of a solenoid operated bolt.

The lock of a locking apparatus of the invention may operate to stop a door handle operable to release a door from being operated such as by rotation.

15

The locking apparatus according to the invention may be advantageously combined with a number of other features. Other features include the use of audible, visual or tactile signals operable when the door is in an open position or when a door in an open position longer than a given time so as to alert the user to the need to close the
20 door, lock the door and retrieve the key.

A further aspect of the invention comprises a security system. The security system comprises a locking apparatus as previously described when the system comprises a sensor that detects if the door is in a closed position. Such a sensor and other parts of
25 a security system may be linked to a central computer control such as are commonly used in hotels, prisons and other institutions whereby a central controller may monitor and/or adjust the access to doors and other features of the system from a central point. Other features of such systems include the potential for in situ reprogramming of key cards and the like. A security system according to the invention may comprise the

audible, visual and tactile signalling means for operation when the door is in an open position and/or when the key is in the lock even if the door is in a closed position so as to help ensure the a user remembers to close the door and /or when closed to lock the door and /or when locked the user retrieves the key from the door.

5

A locking apparatus of the invention, while used with a door, may be sold as a kit of parts comprising a lock and one or more key cards for the lock, which operate as previously described. It is considered within the scope of the invention that security systems and locking apparatus according to the invention may incorporate over ride and master key type operations such that, for example, on failure of the locking apparatus or in an emergency access through the door is still possible. Furthermore, locking apparatus of the invention may be constructed such that it is necessary to utilise two or more keys simultaneously or in sequence so as to activate, ie lock or unlock the locking apparatus. Such simultaneous use may be from the same or from opposing sides of the door.

Other features of a locking apparatus or security system of the invention may require a mode of operation of the locking apparatus such that it is necessary to pass a key from a first side of the door to the second side of the door, wherein the second side of the door is still not accessible and that a second person use the key on the second side of the door through to the first side of the door, ie a pass-back arrangement, before the door can be unlocked. This has the advantage that not only does the key act to lock or unlock the door but the key, for example, in the form of an identity pass is safely passed to security personnel on the second side of the door for checking before it is possible for the door to be opened. The door is thereby only opened when the security personnel pass the card back from the second side of the door to the first side of the door, returning it to the key holder and also allowing the key holder access. This aspect of the invention conveniently allows security personnel on a second side of the door to retain the key and deny access to a person on the first side of the door without

(
ever having to come into contact with the person on the first side of the door, as for example, may be appropriate in high security situations.

The locking apparatus of the invention is considered to minimally comprise the lock
5 and the key, however, it may also be considered to comprise the door and any bolt-retaining means.

The invention will now be illustrated by means of the following drawings in which:

10 Figure 1 shows an elevation of a side of a door equipped with a lock forming part of a locking apparatus according to the invention;

Figure 2 shows a card key of a locking apparatus of the invention;

15 Figure 3 shows a side elevation of an edge of a door equipped with a lock forming part of a locking apparatus according to the invention and;

Figure 4 which shows a schematic representation of a security system according to the invention.

20

In the Figures like numbers represent like features.

(
Referring now to Figures 1, 2 and 3 which should be viewed together and are so described. All mechanical elements in the figures are shown in schematic form only.

Figure 1 shows a side elevation of a lock/door combination 2 forming part of a locking apparatus according to the invention. A lock 4 is located in a door 10, door 10 being itself located in a door jamb 12, for example by means of hinges (not shown).

Card slot 16 is arranged perpendicular to a first face of the lock 24 which itself is coplaner with a first face of the door 14. The lock also comprises a handle 30 which may be manually rotated to engage and withdraw a door bolt 40 which engages with a door bolt retaining means 44 in the door jamb 12. The ability to rotate the handle 30 is determined by the activation or otherwise of a locking solenoid 58. Alternatively, such a solenoid may be used to engage with the bolt 40 or in alternative embodiments no solenoid may be required and a purely mechanical interaction may be present between the handle 30, the bolt 40 and the other portions of the lock, so as to enable locking and unlocking of the door (10).

The lock 4 comprises a card slot 16 in which a card key 6 is engagable. Card slot 16 is associated with a card key reading means in the form of a magnetic strip reading means 50 and optional card clamping means 52 to engage with a card key when inserted into the card slot 16. Inserting the card key 6 into the lock 4 serves to unlock the lock. Removing the card key 6 from the lock 4 serves to enable the user to retain the key and may be contingent upon the door being locked. When the door is closed when used with an electrically operated locking apparatus of the invention removal of the card may cause the door to be locked.

Figure 2 shows a card key 6 for use with a locking apparatus of the invention. Card key 6 comprises a plastic credit-card-type key with a lower edge comprising a

plurality of indentations 26 for engagement in the lock. Card key 6 also comprises a magnetic strip 56 for reading by the lock, using magnetic strip reading means 50.

Figure 3 shows a side elevation of an edge 20 of the door 10. Lock 4 is located in door 10 such that the lock 4 is accessible from a first face 24 of the lock located on a first face 14 of the door and from a second face 54 of the door 10 where a second face 64 of the lock 4 is present. A card 6 may therefore be engaged in a first face of the lock 24 by means of card slot 16 and the card may exit a second face 64 of the lock 4 on a second side of the door 54. A star wheel 46 is present in the mechanism of the lock and star wheel 46 engages with indentations 26 on the bottom face of the card key as the card key is placed into and traverses through card slot 16 which is located between the first face 24 and the second face 64 of the lock. Star wheel 46 is engagable by a retaining mechanism 42 which enables rotation of the star wheel 46 to be prevented such that the card key 6 may no longer be traversed through card slot 16 in the lock 4. If the lock 4 recognises that key 6 is valid then a user may rotate handle 30 which is located on a spindle 32 such that bolt 40 may be retracted into the lock, or extended from the lock with respect to the side face 20 of the door 10. The star wheel 46 is a form of a toothed wheel.

In use when card key 6 is inserted into card slot 16 the card key 6 rotates star wheel 46 until the card key is fully engaged with the lock. At which point star wheel 46 is prevented from rotation by retaining mechanism 42. The bolt 40 may then be withdrawn by rotating handle 30 if the key has been recognised by the lock. The door is opened and the key holder goes through the door 10, closes the door 10 and locks the door using handle 30' to extend bolt 40. Retaining means 42 then releases star wheel 46 and the key card 6 may be removed from the second side of the door 54. During the operation of the lock 4 card key 6 is not removable from the (first) side of insertion 14 after indentations 26 are engaged by star wheel 46. Once engaged star wheel 46 is retained by a ratchet mechanism such that the card key 6 can only be

(
inserted further into the card slot 16 and not retrieved from the first side 24 of the lock 4.

5 Figure 4 shows a schematic view of a security system according to the invention which comprises a locking apparatus as previously described. The security system comprises a door lock control logic 100 which is interfaced with a number of other elements including a card reader 102 for reading a card key 6 and a card locking solenoid 104 for engaging a means to retain a card key 6 in the door 10 when signalled to do so by door control logic 100. Door control logic 100 is also interfaced
10 with a door lock solenoid 106 for locking and/or unlocking the door 10, a door position sensor 108 for sensing whether the door 10 is in an open or closed position and a door alarm 110 for giving a visual auditory or other sensory signal to a user during operation of the security system. Door lock control 100 is also interfaced to a master computer 112. The master computer 112 has a control interface 114 wherein
15 an operator may remotely operate door control logic 100 and other similar locking apparatus as herein before described. Also interfaced to master computer 112 is a card programmer 116 whereby a key card 6 may be programmed or reprogrammed so as to be recognised or otherwise by door control logic 100.

CLAIMS

5

1. A locking apparatus for a door comprising a key wherein the key is engageable, at a first side of the door, with a lock so as to enable the door to be unlocked wherein the card is subsequently only removable from a its engagement with the lock, at a second side of the door remote from the first side.
10
2. A locking apparatus according to claim 1 wherein the key is in the form of a card.
- 15 3. A locking apparatus according to either claim 1 or claim 2 wherein the key is only removable once engaged in the lock when the door is again locked.
4. A locking apparatus according to any of claims 1 to 3 wherein the door can only be locked when the door is in a closed position that renders access to the first side of the door from the second side is unavailable.
20
5. A locking apparatus according to any one of claims 1 to 4 wherein the key may be used from the second side to the first side of the door as it is useable from the first to the second side.
25
6. A locking apparatus according to any previous claim wherein on each subsequent use of the key the function of the first and second sides of the lock interchange.
- 30 7. A locking apparatus according to any previous claim wherein the lock is located in the door.

A

- (
8. A locking apparatus according to any previous claim wherein the lock is located in the door jamb.
- 5 9. A locking apparatus for a door according to any previous claim wherein the key engages the lock apparatus by means of one or more indentations in the key.
- 10 10. A locking apparatus according to claim 9 wherein the one or more indentations in the key engage with the lock by means of a toothed wheel in the lock apparatus.
11. A locking apparatus according to claim 10 wherein the toothed wheel serves to operate the lock so as to unlock a locked door or lock an unlocked door.
- 15 12. A locking apparatus according to either of claim 10 or claim 11 wherein the one or more indentations are present on an edge of the key.
- 20 13. A locking apparatus according to any one of claims 9 to 12 wherein the one or more indentations in the key serve to enable retention of the key in the lock so as to prevent removal of the key from the lock during a part of the operation of the locking apparatus.
- 25 14. A locking apparatus according to any previous claim wherein it is necessary to engage the key with the lock so as to unlock the lock to such an extent that the key is no longer accessible from the first side of the door.
- 30 15. A locking apparatus according to any previous claim wherein it is necessary to insert the key into the lock so as to unlock the door to such an extent that the key is no longer accessible from the first side of the door.

- (
16. A locking apparatus according to any previous claim wherein the operation of the key involves the transfer of stored information between the card and the lock.
- 5 17. A locking apparatus according to claim 16 wherein the transfer of stored information involves information stored on a magnetic strip on the key.
18. A locking apparatus according to any previous claim wherein the lock is a mortise lock.
- 10 19. A locking apparatus according to any previous claim wherein the lock comprises a latch.
- 15 20. A security system comprising a locking apparatus as described in any previous claim wherein the system comprises a locking apparatus with a sensor which detects if the door is in a closed position.
- 20 21. A security system comprising a locking apparatus as described in any previous claim wherein the locking apparatus is in communication with a master control remote from the locking apparatus.
22. A kit of parts for a locking apparatus comprising a key in the form of a card and a lock which operate in a manner as described in any previous claim.
- 25 23. A locking apparatus for a door as herein before described with reference to any one of Figures 1 to 3.

Amendments to the claims have been filed as follows

1. A locking apparatus for a door comprising a key wherein the key is engageable, at a first side of the door, with a lock so as to enable the door to be unlocked and the key is subsequently only removable from a its engagement with the lock, at a second side of the door remote from the first side wherein the key is only removable once engaged in the lock when the door is again locked.
2. A locking apparatus according to claim 1 wherein the key is in the form of a card.
3. A locking apparatus according to any of claims 1 to 2 wherein the door can only be locked when the door is in a closed position that renders access to the first side of the door from the second side unavailable.
4. A locking apparatus according to any one of claims 1 to 3 wherein the key may be used from the second side to the first side of the door as it is useable from the first to the second side.
5. A locking apparatus according to any previous claim wherein on each subsequent use of the key the function of the first and second sides of the lock interchange.
6. A locking apparatus for a door according to any previous claim wherein the key engages the lock apparatus by means of one or more indentations in the key.
7. A locking apparatus according to claim 6 wherein the one or more indentations in the key engage with the lock by means of a toothed wheel in the lock apparatus.

8. A locking apparatus according to claim 7 wherein the toothed wheel serves to operate the lock so as to unlock a locked door or lock an unlocked door.
- 5 9. A locking apparatus according to either of claim 7 or claim 8 wherein the one or more indentations are present on an edge of the key.
- 10 10. A locking apparatus according to any one of claims 6 to 9 wherein the one or more indentations in the key serve to enable retention of the key in the lock so as to prevent removal of the key from the lock during a part of the operation of the locking apparatus.
- 15 11. A locking apparatus according to any previous claim wherein it is necessary to engage the key with the lock so as to unlock the lock to such an extent that the key is no longer accessible from the first side of the door.
- 20 12. A locking apparatus according to any previous claim wherein it is necessary to insert the key into the lock so as to unlock the door to such an extent that the key is no longer accessible from the first side of the door.
- 25 13. A locking apparatus according to any previous claim wherein the operation of the key involves the transfer of stored information between the card and the lock.
- 30 14. A locking apparatus according to claim 13 wherein the transfer of stored information involves information stored on a magnetic strip on the key.
15. A locking apparatus according to any previous claim wherein the lock is a mortise lock.

- (
16. A locking apparatus according to any previous claim wherein the lock comprises a latch.
17. A door having installed therein a locking apparatus according to any previous claim.
18. A door jamb having installed therein a locking apparatus according to any of claims 1 to 16.
19. A security system comprising a locking apparatus as described in any previous claim wherein the system comprises a locking apparatus with a sensor which detects if the door is in a closed position.
20. A security system comprising a locking apparatus as described in any previous claim wherein the locking apparatus is in communication with a master control remote from the locking apparatus.
21. A kit of parts for a locking apparatus comprising a key in the form of a card and a lock which operate in a manner as described in any previous claim.
22. A locking apparatus for a door as herein before described with reference to any one of Figures 1 to 3.



INVESTOR IN PEOPLE

Application No: GB 0308223.7
Claims searched: 1-22

Examiner: Philip Silvie
Date of search: 22 July 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1,2,5,8,14-19 at least	US 4 288 783 A (CHAUVAT) see figs. 2,3 and column 4, lines 18-24

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKCV:

E2A

Worldwide search of patent documents classified in the following areas of the IPC⁷:

E05B, G06K, G07C

The following online and other databases have been used in the preparation of this search report :

WPI, EPODOC, JAPIO